

05448829 **Image available**
PHOSPHORIC ACID FUEL CELL

PUB. NO.: 09-063629 [JP 9063629 A]
PUBLISHED: March 07, 1997 (19970307)
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APPL. NO.: 07-208622 [JP 95208622]
FILED: August 16, 1995 (19950816)

ABSTRACT

PROBLEM TO BE SOLVED: To provide a fuel cell equipped with a reinforcing device where the contraction of the length of the thrust of a terminal board is possible and the constitution is simple.

SOLUTION: This fuel cell is equipped with seal plates 3 stacked on both ends of the cell stack consisting of plural unit cells 2, separators, and cooling plates, a collector plate 4 having a terminal board part 4A, an insulating plate 5, and fastening plates 6, and those are united by adding fastening load to a pair of fastening plates 6. This fuel cell is equipped with a reinforcing plate 22 made of, for example, a steel plate having a projecting plate 23 being drawn out along the terminal board 4A, being stacked between the collector plate 4 having the terminal board part 4a and the insulating plate 5, and a reinforcing device 21 consisting of the coupling part 24 having coupled the tip part of the projecting plate of this reinforcing plate with the terminal board.

Bibliographic Fields

Document Identity

(19) 【発行国】

日本国特許庁 (J P)

(12) 【公報種別】

公開特許公報 (A)

(11) 【公開番号】

特開平 9 - 6 3 6 2 9

(43) 【公開日】

平成 9 年 (1 9 9 7) 3 月 7 日

Public Availability

(43) 【公開日】

平成 9 年 (1 9 9 7) 3 月 7 日

Technical

(54) 【発明の名称】

りん酸型燃料電池

(51) 【国際特許分類第 6 版】

H01M 8/24

【FI】

H01M 8/24 Z

【請求項の数】

3

【出願形態】

O L

【全頁数】

5

Filing

【審査請求】

未請求

(21) 【出願番号】

特願平 7 - 2 0 8 6 2 2

(19) [Publication Office]

Japan Patent Office (JP)

(12) [Kind of Document]

Unexamined Patent Publication (A)

(11) [Publication Number of Unexamined Application]

Japan Unexamined Patent Publication Hei 9 - 63629

(43) [Publication Date of Unexamined Application]

1997 (1997) March 7 days

(43) [Publication Date of Unexamined Application]

1997 (1997) March 7 days

(54) [Title of Invention]

PHOSPHORIC ACID TYPE FUEL CELL

(51) [International Patent Classification, 6th Edition]

H01M 8/2 4

[FI]

H01M 8/2 4 Z

[Number of Claims]

3

[Form of Application]

OL

[Number of Pages in Document]

5

[Request for Examination]

Unrequested

(21) [Application Number]

Japan Patent Application Hei 7 - 208622

(22) 【出願日】

平成 7 年 (1 9 9 5) 8 月 1 6 日

(22) [Application Date]

1995 (1995) August 16 days

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Abstract

(57) 【要約】

【目的】

端子板部の突き出し長さの縮小が可能で、構成が簡素な補強装置を備えたりん酸型燃料電池を提供する。

【構成】

複数の単位セル 2,セパレータ,および冷却板からなる電池積層体 1 の両端部に積層されたシール板 3,端子板部 4A を有する集電板 4,絶縁板 5,および締付板 6 を備え、一対の締付板

(57) [Abstract]

[Objective]

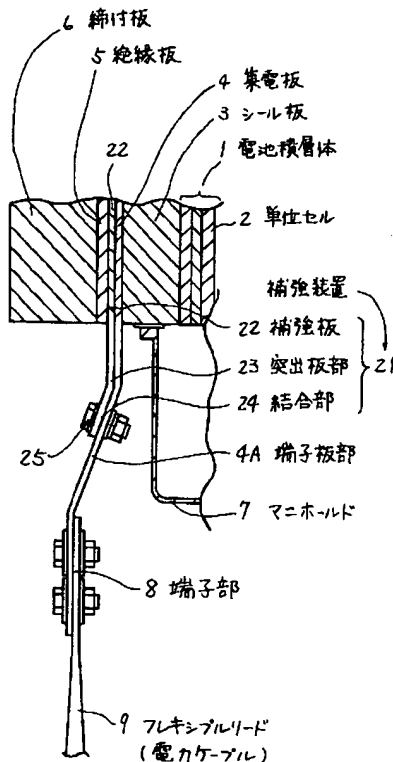
Reduction of protrusion length of terminal sheet section being possible, phosphoric acid type fuel cell to which constitution has simple reinforcement device is offered.

[Constitution]

In phosphoric acid type fuel cell which is unified by having collector plate 4, insulation board 5, and tightening sheet 6 which possess seal sheet 3, terminal sheet section 4 A which is laminated to unit cell 2, separator, of plural and both ends

間 6 に締付荷重を加えることにより一体化されたりん酸型燃料電池において、端子板部 4A を有する集電板 4 と絶縁板 5 との間に積層されて端子板部 4A に沿って引き出された突出板部 23 を有する例えば鋼板製の補強板 22 と、この補強板の突出板部の先端部分を端子板部に連結した結合部 24 とからなる補強装置 21 を備える。

of battery stack body 1 which consists of cooled plate tightens between 6 tightening sheet of pair and adds load, Being laminated between collector plate 4 and insulation board 5 which possess the terminal sheet section 4 A, it has reinforcement device 21 which consists of reinforcing plate 22 of for example steel sheet which possesses protruding sheet section 23 which was pulled out alongside terminal sheet section 4 A and bond 24 which connects lobe of protruding sheet section of this reinforcing plate to terminal sheet section.



Claims

【特許請求の範囲】

[Claim(s)]

【請求項 1】

[Claim 1]

複数の単位セル、セパレータ、および冷却板の積層体の両端部に積層されたシール板、端子板部を有する集電板、絶縁板、および締付板を備え、前記一対の締付板間に締付荷重を加えることにより一体化されたりん酸型燃料電池において、端子板部を有する集電板と絶縁板との間に積層されて前記端子板部に沿って引き出された突出板部を有する補強板と、この補強板の突出板部の先端部分を端子板部に連結した結合部とからなる補強装置を備えたことを特徴とするりん酸型燃料電池。

In phosphoric acid type fuel cell which is unified by having collector plate, insulation board, and tightening sheet which possess unit cell, separator, of plural and seal sheet, terminal sheet section which is laminated to both ends of stack body of cooled plate, tightens between tightening sheet of aforementioned pair and adds load, Being laminated between collector plate and insulation board possessing terminal sheet section, phosphoric acid type fuel cell. which had reinforcement device which consists of bond which connects lobe of protruding sheet section of reinforcing plate and this reinforcing plate which possess protruding sheet section which was pulled out alongside aforementioned terminal sheet

【請求項 2】

請求項 1 記載のりん酸型燃料電池において、突出板部を有する補強板が鋼板からなることを特徴とするりん酸型燃料電池。

【請求項 3】

複数の単位セル、セパレータ、および冷却板の積層体の両端部に積層されたシール板、端子板部を有する集電板、絶縁板、および締付板を備え、前記一对の締付板間に締付荷重を加えることにより一体化されたりん酸型燃料電池において、前記絶縁板が前記端子板部に沿って引き出された突出板部を備え、この突出板部の先端部分が端子板部に連結されて補強装置を形成したことを特徴とするりん酸型燃料電池。

Specification

【発明の詳細な説明】

【0001】

【産業上の利用分野】

この発明は、発電電力取り出し用の端子板に補強装置を備えたりん酸型燃料電池に関する。

【0002】

【従来の技術】

図 3 は補強装置を有する従来のりん酸型燃料電池の要部を示す断面図である。

図において、電池積層体 1 は、電解質としてのりん酸を含浸したマトリックスを燃料電極および空気電極で挟持した単位セル 2 複数層をガス不透過性のセパレータ、りん酸リザーバ、冷却板などを介在させて複数層積層したものからなり、その積層方向の両端部にはシール板 3、端子板部 4A を有する集電板 4、絶縁板 5、および締付板 6 を備え、一对の締付板 6 間に締付荷重を加えることにより一体化されたりん酸型燃料電池(スタック)が構成される。

また、スタックの四方の側壁面には各単位セル 2 に互いに直交する方向に凹溝として形成された燃料供給溝および空気供給溝に燃料ガ

section to terminal sheet section makes feature

[Claim 2]

phosphoric acid type fuel cell. where reinforcing plate which possesses protruding sheet section in the phosphoric acid type fuel cell which is stated in Claim 1, consists of steel plate and makes feature

[Claim 3]

In phosphoric acid type fuel cell which is unified by having collector plate, insulation board, and tightening sheet which possess unit cell, separator, of plural and seal sheet, terminal sheet section which is laminated to both ends of stack body of cooled plate, tightens between tightening sheet of aforementioned pair and adds load, aforementioned insulation board protruding sheet section which was pulled out alongside aforementioned terminal sheet section having, lobe of this protruding sheet section being connected by terminal sheet section, reinforcement device was formed phosphoric acid type fuel cell. which is made feature

[Description of the Invention]

[0001]

[Field of Industrial Application]

This invention regards phosphoric acid type fuel cell which provides reinforcement device for terminal sheet for generated electric power removal.

[0002]

[Prior Art]

Figure 3 is sectional view which shows principal part of conventional phosphoric acid type fuel cell which possesses reinforcement device.

In figure, collector plate 4, insulation board 5, and tightening sheet 6 where battery stack body 1 the matrix which impregnates phosphoric acid as electrolyte consists of those which lying between, multilayer lamination do fuel electrode and unit cell 2 multiple layers which clamping is done separator, phosphoric acid reservoir, cooled plate etc of gas impermeability with air electrode, in both ends of the laminate direction possesses seal sheet 3, terminal sheet section 4 A having, It tightens between tightening sheet 6 of pair and phosphoric acid type fuel cell (stack) which is unified by adding load is formed.

In addition, in side wall surface of square of stack giving manifold 7 of 2 pairs in order to discharge is connected fuel gas and reaction air by airtight in fuel supply groove and air

スおよび反応空気を給排出するための 2 対のマニホールド 7 が気密に結合され、燃料供給溝および空気供給溝を介して各単位セルの燃料電極に燃料ガスを、空気電極に反応空気を供給することにより、電気化学反応に基づく発電が行われる。

【0003】

りん酸型燃料電池の発電電力は、端子板部 4A とフレキシブルリードまたは電力ケーブル 9 とを端子部 8 で導電接続することにより、図示しない電力変換装置などに送られる。

ところで、端子部 8 のボルト締め作業に際して、導電性は高いが剛性の低い銅材からなる端子板部 4A が変形したり、その付け根で破損するのを防ぐとともに、輸送時や地震などによる外力により端子板部 4A が変形したり、その付け根で破損するのを防ぐために、端子板部 4A には補強装置 11 が設けられる。

補強装置 11 は、一方端を締付板 6 にボルト 13 で結合した例えば鉄製の補強アーム 12 が用いられ、この補強アーム 12 の他方端が絶縁クランプ 14 を介して端子板部 4A と電氣的に絶縁された状態でクランプボルト 15 で機械的に結合されることにより、締付板に固定された補強アーム 12 の剛性を利用して端子板部 4A が機械的に補強される。

【0004】

【発明が解決しようとする課題】

従来の補強装置では、補強アーム 12 が接地構造物である締付板 6 に固定されているため、補強アーム 12 を端子板部 4A と電氣的に絶縁するために絶縁クランプ 14 を必要とする。

このため、端子部 8 までの端子板部 4A の突き出し長さが長くなり、かつこれが原因で必要な補強強度を得るために補強アーム 12 の断面積も大きくなる。

その結果、補強装置の構造が複雑化、大型化するとともに、端子装置全体の大型化を招くという欠点があり、例えば輸送中突出した端子部 8 が他物と接触して損傷するなどの予期しないトラブルの発生原因ともなり、その改善が求められている。

supply groove which wereformed to direction which crosses mutually in each unit cell 2 as the channel, Through fuel supply groove and air supply groove, generation of electricity which is based on electrochemical reaction fuel gas, by supplying the reaction air to air electrode in fuel electrode of each unit cell, is done.

[0003]

generated electric power of phosphoric acid type fuel cell is sent to unshown electric power conversion device etc terminal sheet section 4 A and flexible lead or electric power cable 9 by conductive connection doing with the terminal 8.

By way, electroconductivity it is high in case of bolt-tightening job of the terminal 8, but terminal sheet section 4 A which consists of copper material where stiffness is low deforms, fact that breakage it does is prevented with attaching base, in order to prevent fact that 2 and also, terminal sheet section 4 A becomes deformed with such as when and earthquake transporting with external force, with attaching base breakage does, It can provide reinforcement device 11 in terminal sheet section 4 A.

Reinforcement device 11 tightens one end and in with state to which for example iron reinforcement arm 12 which is connected to sheet 6 with volt 13 is used, other end of this reinforcement arm 12 through insulating clamp 14, in terminal sheet section 4 A and electrical insulating is done being connected to mechanical with clamp volt 15 depending, terminal sheet section 4 A is reinforced to mechanical making use of the stiffness of reinforcement arm 12 which is locked to tightening sheet.

[0004]

[Problems to be Solved by the Invention]

With conventional reinforcement device, because it is locked to the tightening sheet 6 where reinforcement arm 12 is ground structure, there reinforcement arm 12 terminal sheet section 4 A and electrical insulating clamp 14 is needed in order insulating to do.

Because of this, protrusion length of terminal sheet section 4 A to terminal 8 becomes long, also cross-sectional area of reinforcement arm 12 becomes large because at same time this obtains necessary reinforced strength with the cause.

As a result, as structure of reinforcement device does complication, scale-up, there is a deficiency that, causes scale-up of terminal device entirety, during for example transporting terminal 8 which protruding is done contacts with other ones and or other which injury is done becomes also cause of trouble which is not expected, improvement is sought.

【0005】

この発明の目的は、端子板部の突き出し長さの縮小が可能で、構成が簡素な補強装置を備えたりん酸型燃料電池を提供することにある。

【0006】

【課題を解決するための手段】

前述の目的を達成するために、請求項 1 に記載の発明は、複数の単位セル、セパレータ、および冷却板の積層体の両端部に積層されたシール板、端子板部を有する集電板、絶縁板、および締付板を備え、前記一對の締付板間に締付荷重を加えることにより一体化されたりん酸型燃料電池において、端子板部を有する集電板と絶縁板との間に積層されて前記端子板部に沿って引き出された突出板部を有する補強板と、この補強板の突出板部の先端部分を端子板部に連結した結合部とからなる補強装置を備える。

【0007】

ここで、請求項 2 に記載の発明は、請求項 1 に記載のりん酸型燃料電池において、突出板部を有する補強板に鋼板を用いると良い。

また、請求項 3 に記載の発明は、複数の単位セル、セパレータ、および冷却板の積層体の両端部に積層されたシール板、端子板部を有する集電板、絶縁板、および締付板を備え、前記一對の締付板間に締付荷重を加えることにより一体化されたりん酸型燃料電池において、前記絶縁板が前記端子板部に沿って引き出された突出板部を備え、この突出板部の先端部分を端子板部に連結して補強装置を形成すると良い。

【0008】

【作用】

請求項 1 に記載の発明では、補強板を集電板と絶縁板との間に積層したことにより、補強板を締付板間の締付荷重を利用してスタックに固定できるとともに、補強板と集電板が同電位となるため、両者の結合部に絶縁クランプを用いる必要もなくなるので、補強装置

[0005]

objective of this invention, reduction of protrusion length of terminal sheet section being possible, is to offer phosphoric acid type fuel cell to which constitution has simple reinforcement device.

[0006]

[Means to Solve the Problems]

In phosphoric acid type fuel cell which is unified by fact that in order to achieve the aforementioned objective, invention which is stated in Claim 1 has collector plate, insulation board, and tightening sheet which possess unit cell, separator, of the plural and seal sheet, terminal sheet section which is laminated to both ends of the stack body of cooled plate, tightens between tightening sheet of the aforementioned pair and adds load, Being laminated between collector plate and insulation board which possess the terminal sheet section, it has reinforcement device which consists of the bond which connects lobe of protruding sheet section of reinforcing plate and this reinforcing plate which possess protruding sheet section which was pulled out alongside aforementioned terminal sheet section to terminal sheet section.

[0007]

Here, invention which is stated in Claim 2 when steel plate is used for reinforcing plate which possesses protruding sheet section in phosphoric acid type fuel cell which is stated in Claim 1, is good.

In addition, in phosphoric acid type fuel cell which is unified by fact that the invention which is stated in Claim 3 has collector plate, insulation board, and the tightening sheet which possess unit cell, separator, of plural and seal sheet, terminal sheet section which is laminated to both ends of stack body of cooled plate, tightens between tightening sheet of aforementioned pair and adds load, When aforementioned insulation board it has protruding sheet section which was pulled out alongside aforementioned terminal sheet section connects the lobe of this protruding sheet section to terminal sheet section and forms the reinforcement device it is good.

[0008]

[Working Principle]

With invention which is stated in Claim 1, to tighten reinforcing plate reinforcing plate with collector plate and laminating between insulation board, as it can lock in stack making use of tightening load between the sheet, because reinforcing plate and collector plate become same voltage, because it becomes necessary to use insulating clamp for bond

の構造が簡素化され、かつ絶縁クランプが不要になった分端子板部の長さが短縮される。

【0009】

ここで、請求項 2 に記載の発明では、突出板部を有する補強板に鋼板を用いることにより、鋼材の持つ高い剛性を利用して機械的補強強度の高い補強装置が得られる。

また、請求項 3 に記載の発明では、絶縁板に突出板部を付加したことにより、補強板が不要になり、その分スタックの部品点数の増加を回避されるとともに、突出板部に繊維強化絶縁材または鋼材を用いることにより、その高い剛性を利用して補強強度の高い補強装置が得られる。

【0010】

【実施例】

以下この発明を実施例に基づいて説明する。

なお、従来例と同じ参照符号を付けた部材は従来例のそれと同じ機能をもつので、その説明を省略する。

図 1 はこの発明の一実施例になるりん酸型燃料電池の要部の断面図である。

図において、補強装置 21 はりん酸型燃料電池(スタック)の集電板 4 と絶縁板 5 との間に積層された例えば鋼板製の補強板 22 と、この補強板 22 から端子板部 4A に沿って突設された突出板部 23 と、突出板部 23 の先端部と端子板部 4A とをボルト、ナットなどの連結部材 25 で相互に連結した結合部 24 とで構成される。

なお、補強板 22 と突出板部 23 とを同じ鋼板から切り出した一体物として形成しても良く、また溶接により両者を一体化しても良い。

【0011】

このように構成された補強装置 21 は補強板 22 を一対の締付板 6 間の締付荷重を利用してスタックに固定できるとともに、補強板 22 と集電板 4 とが同電位となるために両者の結合部 24 に絶縁クランプを用いる必要もなく

of both without, structure of reinforcement device is done simplification, length of amount terminal sheet section where at same time insulating clamp has become unnecessary is shortened.

[0009]

Reinforcement device where mechanical reinforced strength is high making use of high stiffness where here, with invention which is stated in Claim 2, the steel material it has by using steel plate for reinforcing plate which possesses the protruding sheet section, is acquired.

In addition, with invention which is stated in Claim 3, the reinforcing plate becomes unnecessary by adding protruding sheet section to insulation board, as increase of number of parts of stack is evaded that much, there reinforcement device where reinforced strength is high by using fiber reinforced insulator or the steel material for protruding sheet section, making use of that high stiffness is acquired.

[0010]

[Working Example(s)]

This invention below is explained on basis of Working Example.

Furthermore, because as Prior Art Example member which attaches same reference number has same function as that of Prior Art Example, explanation is abbreviated.

Figure 1 is sectional view of principal part of phosphoric acid type fuel cell which becomes one Working Example of this invention.

protruding sheet section with tip portion of 23 which is installed in the figure, reinforcement device 21 suppleness it is from collector plate 4 of acid type fuel cell (stack) and reinforcing plate 22 and this reinforcing plate 22 of for example steel sheet which is laminated between insulation board 5 alongside terminal sheet section 4 A and protruding sheet section 23 and terminal sheet section 4 A is formed bond 24 which is connected mutually with bolt, nut or other coupling 25.

Furthermore, it is good forming, as integrated product which cuts reinforcing plate 22 and protruding sheet section 23 from same steel plate in addition with welding unifying both it is good.

[0011]

This way because reinforcement device 21 which is formed as reinforcing plate 22 can be locked in stack making use of tightening load between tightening sheet 6 of pair, becomes necessity to use the insulating clamp for bond 24 of both because reinforcing plate 22 and collector plate 4 become

なるので、補強装置の構造が簡素化され、かつ絶縁クランプが不要になった分突出板部 23 および端子板部 4A の長さが短くて済むので、輸送中端子部を外力により損傷するトラブルも生じにくくなる。

したがって、構成が簡素で端子板部の付け根に対する機械的補強効果が高い補強装置を備えたりん酸型燃料電池を提供できる。

【0012】

図 2 はこの発明の異なる実施例になるりん酸型燃料電池の要部の断面図である。

図において、この実施例が図 1 に示す実施例と異なるところは、従来接地される締付板 6 と高電位にある集電板 4 とを電氣的に絶縁するために設けられる絶縁板 5 に、端子板部 4A に沿って突設された突出板部 36 を付加し、この突出板部 36 の先端部と端子板部 4A とを結合部 34 で連結して補強装置 31 とした点にある。

【0013】

この実施例によれば、絶縁板 5 に突出板部 36 を付加したことにより、図 1 に示す実施例で必要とした補強板 22 が不要になり、その分スタックの部品点数の増加が回避されて軽量化に寄与できる。

また、絶縁クランプが不要になるので、補強装置の構成が簡素化される。

さらに、端子板部 4A の長さが短縮されて機械的安定度が増すとともに、絶縁板 5 と突出板部 36 とを一体に形成するか、あるいは繊維強化絶縁材または鋼材からなる突出板部 36 を絶縁板 5 の延出部に固定するよう構成することにより、その高い剛性を利用して機械的補強強度の高い補強装置が得られる。

【0014】

【発明の効果】

この発明のりん酸型燃料電池は前述のように、集電板と端子板部との付け根の機械的補強装置として、集電板と絶縁板との間に例え

same voltage without, structure of reinforcement device is done simplification, At same time because amount protruding sheet section length of 23 where insulating clamp becomes unnecessary and terminal sheet section 4 A maybe short, difficult to occur depending upon external force, while transporting terminal also trouble which injury is done becomes.

Therefore, constitution being simple, phosphoric acid type fuel cell which has thereinforcement device where mechanical reinforcing effect for attaching base of terminal sheet section is high can be offered.

【0012】

Figure 2 is sectional view of principal part of phosphoric acid type fuel cell which becomes Working Example where this invention differs.

In figure, as for place where it differs from Working Example which this Working Example shows in Figure 1, tightening sheet 6 which ground is done until recently and protruding sheet section 36 which is installed alongside terminal sheet section 4 A is added to insulation board 5 which is provided in order collector plate 4 which is high voltage insulating to make in electrical, Connecting tip portion and terminal sheet section 4 A of this protruding sheet section 36 with bond 34, there is a point which it makes thereinforcement device 31.

【0013】

reinforcing plate 22 which is needed with Working Example which is shown in Figure 1 according to this Working Example, by adding protruding sheet section 36 to insulation board 5, becomes unnecessary, increase of number of parts of stack can be evaded that much and can contribute to weight reduction.

In addition, because insulating clamp becomes unnecessary, constitution of reinforcement device is done simplification.

Furthermore, length of terminal sheet section 4 A being shortened, as mechanical stability increases, to lock protruding sheet section 36 which forms the insulation board 5 and protruding sheet section 36 as one unit, or in order consists of the fiber reinforced insulator or steel material in extended part of insulation board 5, in constituting depending, Reinforcement device where mechanical reinforced strength is high making use of that high stiffness is acquired.

【0014】

[Effects of the Invention]

phosphoric acid type fuel cell of this invention aforementioned way, laminated the reinforcing plate of for example steel sheet between collector plate and insulation

ば鋼板製の補強板を積層し、この補強板から端子板部に沿って引き出した突出板部をその先端で端子板部に連結するよう構成した。

その結果、接地電位となる補強板に固定された補強アームを用いた従来技術で必要とした絶縁クランプが不要になり、その分端子板部の長さが短縮されて外力に対する端子板部の機械的安定度が向上するとともに、構成が簡素化された補強装置を有するりん酸型燃料電池を提供できる。

【0015】

また、突出板部を絶縁板に支持させるよう構成しても良く、この場合補強板が不要になり、補強装置およびスタックの構成の簡素化、軽量化に貢献できる利点が得られる。

【図面の簡単な説明】

【図 1】

この発明の一実施例になるりん酸型燃料電池の要部の断面図

【図 2】

この発明の異なる実施例になるりん酸型燃料電池の要部の断面図

【図 3】

補強装置を有する従来のりん酸型燃料電池の要部を示す断面図

【符号の説明】

1

電池積層体

11

補強装置

12

補強アーム

14

board as mechanical reinforcement device of attaching base of collector plate and terminal sheet section, in order protruding sheet section which was pulled out from this reinforcing plate alongside terminal sheet section to connect to terminal sheet section with the end constituted.

As a result, insulating clamp which is needed with Prior Art which uses thereinforcement arm which is locked to reinforcing plate which becomes the ground potential becomes unnecessary, length of terminal sheet section is shortened that much and as mechanical stability of terminal sheet section for external force improves, constitution can offer phosphoric acid type fuel cell which possesses thereinforcement device which simplification is done.

[0015]

In addition, in order to support protruding sheet section in insulation board, it becomes good constituting, in this case reinforcing plate unnecessary, thereinforcement device and benefit which it can contribute to simplification, weight reduction of constitution of stack are acquired.

[Brief Explanation of the Drawing(s)]

[Figure 1]

sectional view of principal part of phosphoric acid type fuel cell which becomes one Working Example of this invention

[Figure 2]

sectional view of principal part of phosphoric acid type fuel cell which becomes Working Example where this invention differs

[Figure 3]

sectional view which shows principal part of conventional phosphoric acid type fuel cell which possesses reinforcement device

[Explanation of Symbols in Drawings]

1

battery stack body

11

Reinforcement device

12

Reinforcement arm

14

絶縁クランプ	insulating clamp
15	15
クランプボルト	clamp bolt
2	2
単位セル	unit cell
21	21
補強装置	Reinforcement device
22	22
補強板	reinforcing plate
23	23
突出板部	protruding sheet section
24	24
結合部	bond
25	25
連結ボルト	attaching bolt
3	3
シール板	seal sheet
31	31
補強装置	Reinforcement device
34	34
結合部	bond
36	36
突出板部	protruding sheet section
4	4
集電板	collector plate
4A	4 A
端子板部	terminal sheet section
5	5
絶縁板	insulation board
6	6

締付板

Tightening sheet

7

7

マニホールド

manifold

8

8

端子部

terminal

9

9

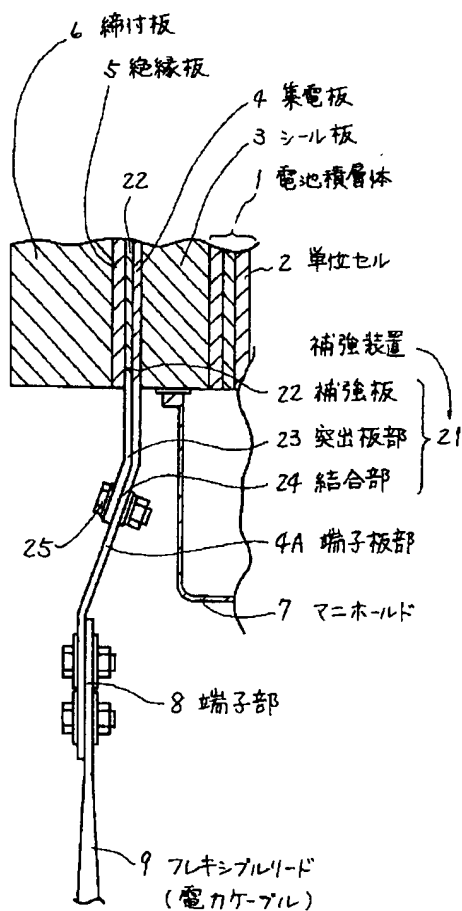
フレキシブルリード(電力ケーブル)

flexible lead (electric power cable)

Drawings

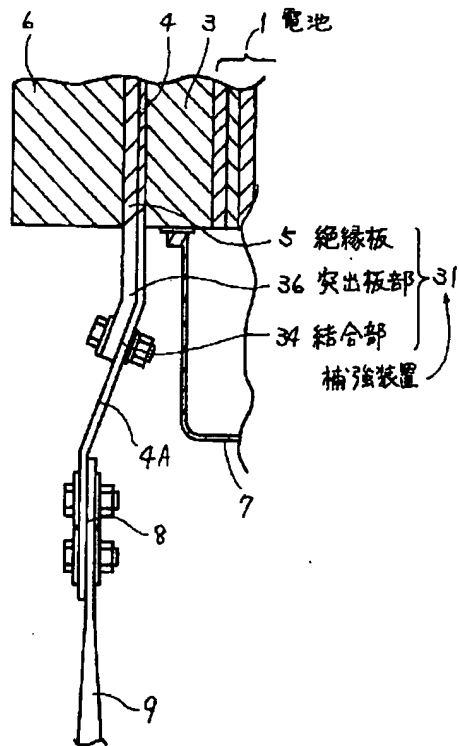
【図 1】

[Figure 1]



【図 2】

[Figure 2]



【図 3】

[Figure 3]

